

US EPA ARCHIVE DOCUMENT



The Success of Conservation Stewardship in Virginia: The Shenandoah Valley's Muddy Creek and Lower Dry River Watersheds

Introduction

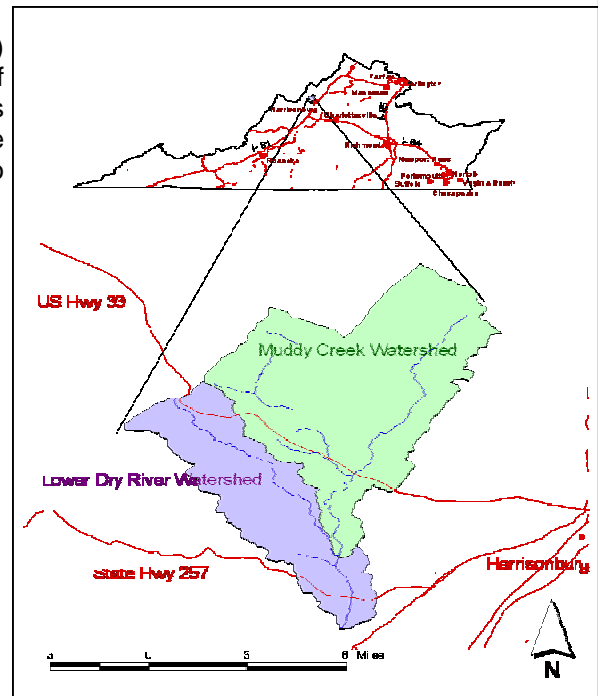
Muddy Creek and Dry River were placed on Virginia's 303(d) List of Impaired Waters in 1996 and 1998 respectively for violations of the fecal coliform water quality standard. In addition, both streams were listed for violating the nitrate public drinking water standard, while Muddy Creek has an additional benthic (aquatic life) impairment due to excess inputs of sediment and phosphorous.

Various agricultural and residential best management practices (BMP's) have been installed through a TMDL implementation project to help address the problems. These BMP's include: dairy loafing lot management systems with loose housing, stream protection, grazing land protection, small grain cover crops, side-dress application of nitrogen on corn, septic tank pump-outs, septic system repairs and replacements, and the installation of alternative waste treatment systems. Significant improvements in fecal coliform counts have been observed in both streams since implementation efforts began in 2001, with Dry River approaching fecal coliform levels necessary for delisting. In addition, substantial improvements have been observed in the benthic community indicative of reduced environmental stress on the aquatic community.

Project Background

Muddy Creek and Dry River are located in Virginia's Shenandoah Valley in Rockingham County approximately five miles west of the City of Harrisonburg. Both streams drain into the North River, which empties into the South Fork Shenandoah River. Rockingham County is listed as the leading poultry producing county in the nation, and according to the Chesapeake Bay Foundation's 2004 Manure Report, it has more excess manure on its animal farms than any other county in the nation. Due to the intensity of agriculture in these watersheds, significant loads of bacteria were identified from pasture and cropland runoff, and from livestock in streams. In addition, failing septic systems and straight pipes were identified as significant sources of bacteria in the watersheds. The Muddy Creek and Lower Dry River areas are home to a large Old Order Mennonite community that has historically installed best management practices voluntarily without accepting cost share assistance.

Agriculture is a predominant source of bacteria in Muddy Creek and Dry River. According to estimates in the TMDLs developed for these watersheds, direct deposit of waste by livestock in streams constitutes approximately 87% of the direct fecal coliform loads in Muddy Creek and 98% of the load in Dry River. It is estimated that 74% of the non-point source load in Dry River comes from pasture land, while pasture contributes approximately 54% of the load in Muddy Creek. The TMDL calls for a 99% reduction in direct deposition of waste from livestock, and a 100% reduction in uncontrolled discharges, which are illegal in the Commonwealth of Virginia. According to the TMDL Implementation Plan, it is estimated that a total of 44 miles of stream fencing will be necessary to achieve these reductions in Muddy





Creek, while 20 miles will be needed in Dry River.

Project Highlights

Residential and agricultural successes have largely been the result of partnerships between the Shenandoah Valley Soil and Water Conservation District (SVSWCD) and several state agencies including the Virginia Departments of Conservation and Recreation and Environmental Quality, Virginia Cooperative Extension, Rockingham County Farm Bureau, and USDA-Natural Resources Conservation Service. Numerous tours have been held to promote the agricultural and residential BMP's offered under the TMDL implementation plan, along with presentations at civic clubs throughout the watersheds, postcard mailings advertising the program, personal contacts with farmers and residents, and meetings updating the community about the water quality improvements.

Since there is such a high livestock density per acre in the Muddy Creek and Lower Dry River watersheds and numerous dairy farm operations in close proximity to a stream, the installation of loafing lot systems with loose housing has helped to control runoff of manure and sediment to the streams. Installation of this BMP allows farmers to keep nutrients on the farm where they are available to be used at the appropriate times. It also allows for transfer of nutrients into other watersheds where there are not nutrient management problems.

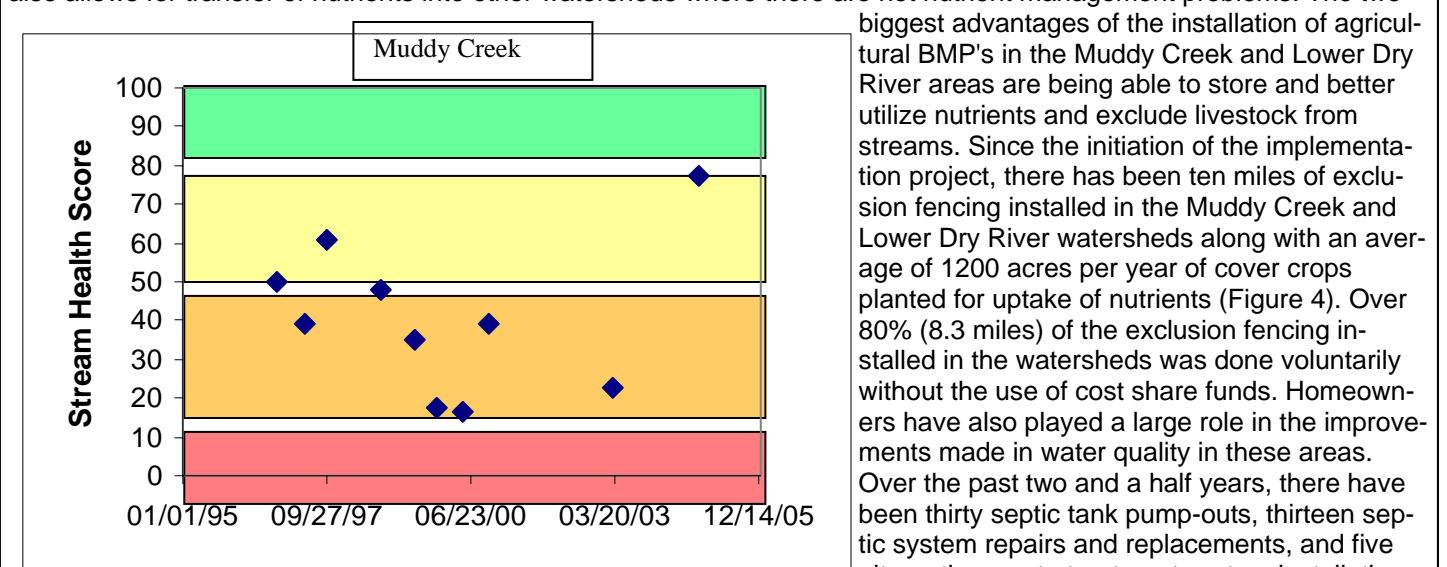
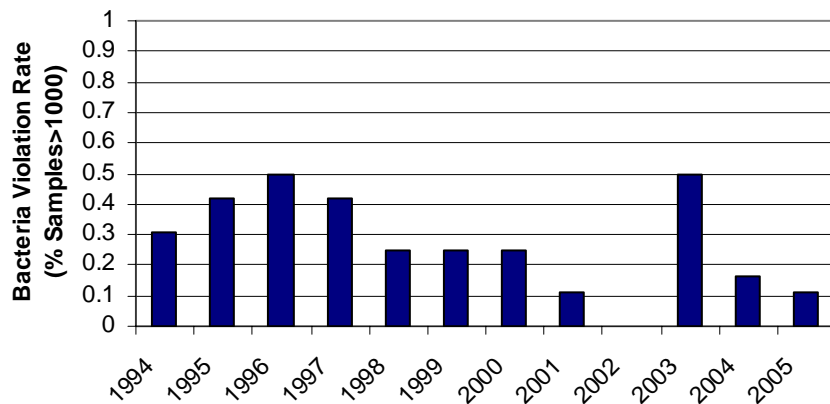


Figure 3. Stream health score for the benthic population in Muddy Creek. Red=severely impaired, Orange=moderately Impaired, Yellow=slightly impaired, Green=not impaired.

gan in 2001, with Dry River approaching fecal coliform levels necessary for de-listing. In addition, substantial improvements have been observed in the benthic community in Muddy Creek.

Figure 1. Violation rate of the 1,000 colony forming units/100ml instantaneous standard for fecal coliform in Muddy Creek.

The two biggest advantages of the installation of agricultural BMP's in the Muddy Creek and Lower Dry River areas are being able to store and better utilize nutrients and exclude livestock from streams. Since the initiation of the implementation project, there has been ten miles of exclusion fencing installed in the Muddy Creek and Lower Dry River watersheds along with an average of 1200 acres per year of cover crops planted for uptake of nutrients (Figure 4). Over 80% (8.3 miles) of the exclusion fencing installed in the watersheds was done voluntarily without the use of cost share funds. Homeowners have also played a large role in the improvements made in water quality in these areas. Over the past two and a half years, there have been thirty septic tank pump-outs, thirteen septic system repairs and replacements, and five alternative waste treatment system installations to replace failing septic systems (Figure 5). As previously stated, significant improvements in fecal coliform counts have been observed in both streams since implementation efforts began in 2001, with Dry River approaching fecal coliform levels necessary for de-listing. In addition, substantial improvements have been observed in the benthic community in Muddy Creek.



Results

The Virginia Department of Environmental Quality (DEQ) monitors the impaired streams through the agency's ambient monitoring program. Monitoring results from the ambient program are then used to gage the progress made towards achieving water quality goals. According to DEQ monitoring data throughout the Shenandoah Valley from 1995-2000 and 2000-2004 (47 stations total), Dry River ranked as the 5th most improved stream and Muddy Creek the 6th most improved in the Valley. Significant improvements in violation rates of the 1,000 colony forming units/100ml instantaneous standard for fecal coliform have since been observed, with Muddy Creek dropping from a high of a 91% violation rate in 1998 to a 44% violation rate in 2005 (Figure 1). Similar im-

Figure 2. Violation rate of the 1,000 colony forming units/100ml instantaneous standard for fecal coliform in Lower Dry River.

provements were observed in the Dry River, which dropped from its highest violation rate of 50% in 1996 to 11% in 2005 (Figure 2). Significant improvements have also been observed in the benthic community in Muddy Creek, which received a stream health score of slightly impaired in 2004 (77%). This score is up from a low of severely impaired (16%) in 1999 (Figure 3). Probably the best news in monitoring results yet is the trend in the North River itself, which benefits from the combined efforts in all upstream tributaries. Of the 13 samples collected in the past two years (2004 and 2005), there have not been any violations of the bacteria water quality standard.

Partners and funding

Several partners have contributed to the success of this project including the Shenandoah Valley Soil and Water Conservation District, Virginia Department of Conservation, Recreation, Virginia Department of Environmental Quality, Virginia Cooperative Extension, Rockingham County Farm Bureau, and Natural Resources Conservation Service. In addition to these partners, the Old Order Mennonite community in which extensive voluntary best management practices, such as stream exclusions and crossings, loose housing barns, and numerous manure storage units have been installed have displayed a stewardship ethic in implementing pollutant source reductions. These practices have greatly influenced improvements in water quality seen throughout the TMDL implementation project. Due to religious beliefs, this community does not accept any financial assistance for installing BMP's. However, the community strongly values land and water resources and took the initiative to install environmentally friendly practices to control runoff from nutrient, bacteria and sediment from entering the streams. Technical assistance, funded with EPA Section 319



Figure 5: Alternative Waste Treatment System in Muddy Creek



funds and administered by the SVSWCD, was provided to the Mennonite community. Over the past five years, money of Section 319 funds have been used to support two full-time staff positions, which have lead to the administration of approximately \$512,750 of cost share for agricultural BMP's and \$71,250 for residential BMP's. Other major sources of funding include \$130,000 USDA/EQUIP. These funds were used to install BMP's not only in Muddy Creek and the Lower Dry River, but also in Mill Creek and Pleasant Run, all of which are part of the North River watershed.

DCR is encouraging stakeholders in other watersheds to become familiar with what has been accomplished in the Muddy Creek and Lower Dry River watersheds based on citizen-based conservation stewardship. Time has demonstrated that stewardship and the TMDL process can bring water quality improvements to local watersheds in Virginia.



Figure 4. Voluntary livestock stream exclusion fencing in Muddy Creek

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